ASSIGNMENT 1

Textbook assignment: Chapter 1, "Tuned Circuits," pages 1-1 through 1-52.

1-1. An inductor presents which of the following types of electrical opposition to ac current flow?

1. Reactance
2. Resistance
3. Inductance
4. Capacitance

1-2. Which of the following electrical characteristics determines the magnitude of inductive reactance?

1. Resistance
2. Frequency only
3. Inductance only
4. Frequency and inductance

1-3. Which of the following values represents an inductive reactance?

1. X_C = 2,220 ohms
2. X_L = 220 ohms
3. L = 22 millihenries
4. C = 22 microfarads

1-4. What formula is used to calculate inductive reactance?

1. $X_L = 2\pi fC$
2. $X_L = 2\pi fL$
3. $X_L = \frac{1}{2\pi fL}$
4. $X_L = \frac{1}{2\pi fC}$

1-5. In an ac circuit, how does inductive reactance respond to an increase in applied frequency?

1. Inductive reactance increases
2. Inductive reactance decreases
3. Inductive reactance remains the same

1-6. What term describes the opposition to ac that causes current to lead voltage?

1. Resistance
2. Conductance
3. Inductive reactance
4. Capacitive reactance

1-7. In an ac circuit, how does capacitive reactance respond to an increase in applied frequency?

1. Capacitive reactance increases
2. Capacitive reactance decreases
3. Capacitive reactance remains the same

1-8. In an ac circuit, what is the term that describes the TOTAL opposition to current flow?

1. Impedance
2. Inductance
3. Resistance
4. Capacitance

1-9. In an ac circuit that contains an inductive reactance of 7,250 ohms and a capacitive reactance of 9,775 ohms, what is the resultant reactance?

1. - 2,525 ohms
2. -10,250 ohms
3. 2,525 ohms
4. 10,250 ohms

1-10. When an ac circuit is at resonance, what is the relationship between X_L and X_C

1. X_L is equal to X_C
2. X_L is less than X_C
3. X_L is greater than X_C

1-11. What formula is used to calculate resonant frequency?

1. $f_r = \frac{1}{2\pi fL}$
2. $f_r = \frac{1}{2\pi fC}$
3. $f_r = \frac{1}{2\pi\sqrt{LR}}$
4. $f_r = \frac{1}{2\pi\sqrt{LC}}$

1-12. In a tank circuit, how does the resonant frequency of the circuit respond to an increase in (a) capacitance and (b) inductance?

1. (a) Increases (b) increases
2. (a) Increases (b) decreases
3. (a) Decreases (b) decreases
4. (a) Decreases (b) increases

1-13. In a resonant circuit, what is the phase angle between voltage and current?

1. 0 degrees
2. 90 degrees
3. 180 degrees
4. 270 degrees

1-14. In a resonant circuit, how does resistance change, if at all, in response to an increase in frequency?

1. Increases
2. Decreases
3. Remains the same

1-15. In a series-LC circuit, which of the following component characteristics describes circuit action (a) below the resonant frequency and (b) above the resonant frequency?

1. (a) Inductive (b) Capacitive
2. (a) Inductive (b) Resistive
3. (a) Capacitive (b) Inductive
4. (a) Capacitive (b) Resistive

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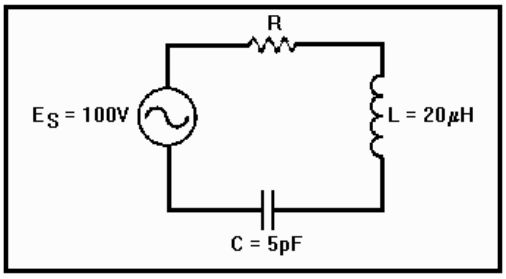

Figure 1A.—Series-resonant circuit.

IN ANSWERING QUESTIONS 1-16 THROUGH 1-21, REFER TO FIGURE 1A.

1-16. What is the resonant frequency for the circuit?

1. 1.592 MHz
2. 92 MHz
3. 159.2 MHz
4. 1,592 MHz

1-17. What is the value of inductive reactance?

1. 1.97 ohms
2. 97 ohms
3. 199.7 ohms
4. 1,997 ohms

1-18. If the resonant frequency is 7.96 MHz, what is the value of capacitive reactance?

1. 500 ohms
2. 1,000 ohms
3. 2,000 ohms
4. 4,000 ohms

IN ANSWERING QUESTIONS 1-19 THROUGH 1-21, ASSUME THE SOURCE FREQUENCY IN FIGURE 1A IS ABOVE THE RESONANT FREQUENCY. SELECT THE ANSWERS THAT DESCRIBE HOW AN ABOVE-RESONANCE FREQUENCY WILL CAUSE THE CIRCUIT CHARACTERISTICS IN THE QUESTIONS TO RESPOND WHEN COMPARED TO THEIR VALUES AT RESONANCE.

1-19. Impedance.

1. Increases
2. Decreases
3. Remains the same

1-20. Current.

1. Increases
2. Decreases
3. Remains the same

1-21. Voltage drops across the reactances.

1. Increases
2. Decreases
3. Remains the same

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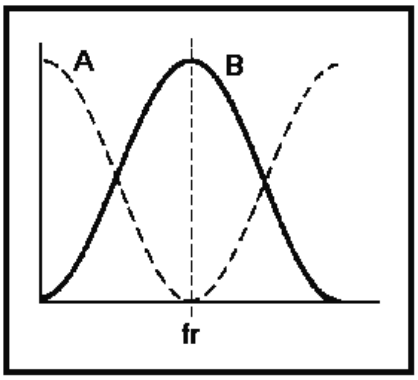

Figure 1B.—Series-resonant circuit curves.

IN ANSWERING QUESTIONS 1-22 AND 1-23, REFER TO FIGURE 1B.

1-22. Response curve B for a series-resonant circuit represents which of the following circuit characteristics?

1. Power
2. Voltage
3. Current
4. Impedance

1-23. At resonance, which of the following series-resonant circuit values is at a maximum value?

1. Circuit current
2. Voltage across L
3. Voltage across C
4. Circuit impedance

1-24. In a series-resonant circuit operating at $_{fr}$, what term describes the impedance of the circuit?

1. Resistive
2. Inductive only
3. Capacitive only
4. Capacitive-inductive

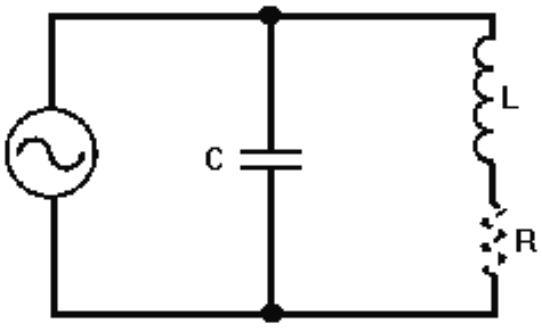

Figure 1C.—Parallel-resonant circuit.

IN ANSWERING QUESTIONS 1-25 THROUGH 1-27, REFER TO FIGURE 1C.

1-25. In the parallel-resonant circuit, what is the phase relationship between the current in the inductor and the current in the capacitor?

1. Inductor current is in phase with capacitor current
2. Inductor current is 45 degrees out of phase with capacitor current
3. Inductor current is 90 degrees out of phase with capacitor current
4. Inductor current is 180 degrees out of phase with capacitor current

1-26. In the parallel-resonant circuit, what is the phase relationship between voltage in the inductor and the voltage in the capacitor.

1. Inductor voltage is in phase with capacitor voltage
2. Inductor voltage is 45 degrees out of phase with capacitor voltage
3. Inductor voltage is 90 degrees out of phase with capacitor voltage
4. Inductor voltage is 180 degrees out of phase with capacitor voltage

1-27. In the parallel-resonant circuit, which of the following circuit conditions is NOT normal?

1. X_C equals X_L
2. I_C equals I_L
3. I_{line} is minimum
4. I_{line} is maximum

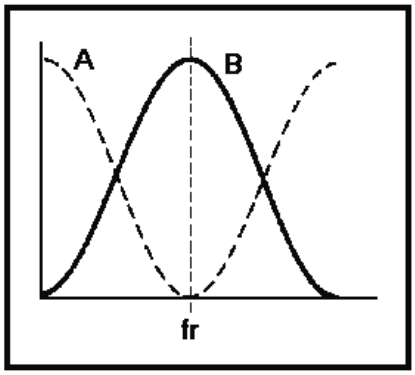

Figure 1D.—Parallel-resonant circuit curves.

IN ANSWERING QUESTIONS 1-28 AND 1-29, REFER TO FIGURE 1D.

1-28. In the figure, what does response curve A represent?

1. Current
2. Impedance
3. Reactance
4. Resistance

1-29. What does response curve B represent?

1. Power
2. Impedance
3. Reactance
4. Resistance

1-30. As a parallel-resonant circuit approaches resonance, which of the following circuit actions takes place?

1. Impedance decreases
2. Oscillating current increases
3. Inductance increases
4. Capacitance decreases

1-31. When a parallel-resonant circuit operates BELOW resonance, which of the following component characteristics describes circuit action?

1. Inductive
2. Capacitive
3. Resistive

1-32. When a parallel-resonant circuit operates ABOVE resonance, which of the following component characteristics describes circuit actions?

1. Inductive
2. Capacitive
3. Resistive

1-33. In a parallel-resonant circuit, which of the following circuit conditions is observed?

1. Oscillating current is less than line current
2. Oscillating current is greater than line current
3. Line current is maximum
4. Impedance is minimum

1-34. What is the level of impedance offered at resonance in (a) a series-resonant circuit and (b) a parallel-resonant circuit?

1. (a) High (b) high
2. (a) High (b) low
3. (a) Low (b) low
4. (a) Low (b) high

1-35. The ability of a resonant circuit to separate currents of desired frequencies from those of undesired frequencies makes them useful in which of the following circuit applications?

1. Filters
2. Counters
3. Amplifiers
4. Voltage dividers

1-36. The Q of a circuit is a measure of circuit

1. quality
2. permeance
3. conductance
4. inductive reactance

1-37. Which of the following circuit values has the greatest effect on the figure of merit of the circuit?

1. Reactance
2. Inductance
3. Resistance
4. Capacitance

1-38. What formula is used to figure the Q of a coil?

1. $Q = \frac{R}{Z}$
2. $Q = \frac{X_L}{Z}$
3. $Q = \frac{R}{X_L}$
4. $Q = \frac{X_L}{R}$

1-39. On which of the following coil characteristics is the Q of a coil dependent?

1. Size
2. Length
3. Material
4. All of the above

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1-40. A series-resonant circuit, which of the following conditions results in a voltage gain?

1. $\frac{X_L}{R}$ increasing
2. $\frac{X_L}{R}$ decreasing
3. $\frac{R}{X_L}$ increasing
4. $\frac{R}{X_L}$ decreasing

1-41. In a parallel-resonant circuit, Q is used to figure which of the following circuit values?

1. Voltage gain
2. Voltage loss
3. Circulating tank current
4. Circulating line current

1-42. To determine bandwidth, you would use which of the following mathematical expressions?

1. $BW = \frac{f_r}{Q}$
2. $BW = \frac{f_r \times X_L}{f_r}$
3. $BW = \frac{R \times X_L}{f_r}$
4. $BW = \frac{R}{f_r \times X_L}$

1-43. To calculate (figure) the half-power points of a resonant circuit, which of the following mathematical expressions should you use?

1. .707 x I_{min}
2. .707 x I_{max}
3. .637 x I_{min}
4. .637 x I_{max}

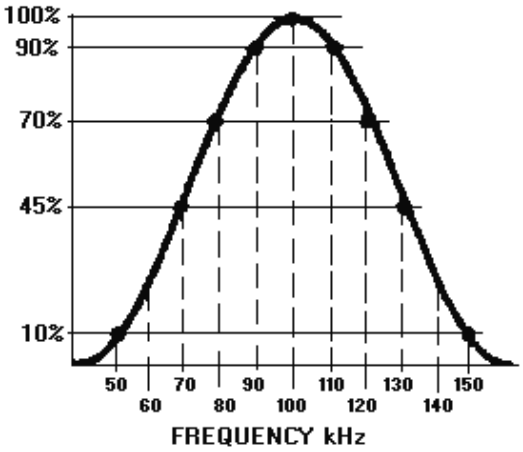

Figure 1E.—Response curve.

IN ANSWERING QUESTIONS 1-44 THROUGH 1-46, REFER TO FIGURE 1E.

1-44. In the response curve, what is the resonant frequency?

1. 50 kHz
2. 70 kHz
3. 100 kHz
4. 140 kHz

1-45. What is the bandwidth?

1. 10 kHz
2. 20 kHz
3. 30 kHz
4. 40 kHz

1-46. If the Q of the circuit represented by the response curve is 100, what is the bandwidth?

1. 1 kHz
2. 10 kHz
3. 20 kHz
4. 30 khz

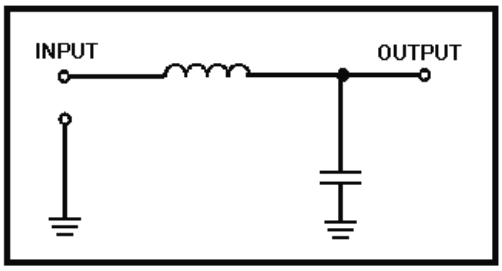

Figure 1F.—Filter circuit.

IN ANSWERING QUESTION 1-47, REFER TO FIGURE 1F.

1-47. If the applied frequency to the circuit is increased, what is the response of (a) X_C and (b) X_L

1. (a) X_C increases (b) X_L increases
2. (a) X_C increases (b) X_L decreases
3. (a) X_C decreases (b) X_L decreases
4. (a) X_C decreases (b) X_L increases

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TO ANSWER QUESTIONS 1-48 THROUGH 1-50, SELECT FROM COLUMN B THE CIRCUIT WHICH DESCRIBES THE CIRCUIT OPERATION IN COLUMN A. CHOICES IN COLUMN B MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

	A. CIRCUIT OPERATION	B. CIRCUIT
1-48.	Passes the majority of current below a specific frequency and opposes current above that frequency.	1. Band-pass filter 2. High-pass filter 3. Low-pass filter 4. Band-reject filter
1-49.	Passes the majority of current above a specific frequency and opposes current below that frequency.	
1-50.	Passes a narrow band of frequencies and opposes all others.	

1-51. The action of a filter circuit that reduces the amplitude of unwanted frequencies below the amplitude of the desired frequency is known as

1. attenuation
2. amplification
3. discrimination
4. impedance matching

1-52. The frequency beyond which a filter circuit no longer passes current is referred to as the

1. filter frequency
2. cutoff frequency
3. resonant frequency
4. response frequency

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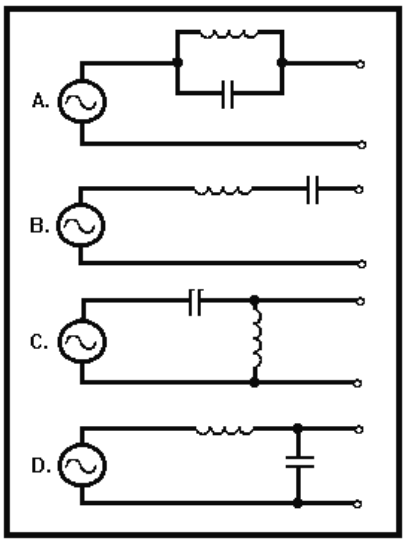

Figure 1G.—Filter circuits.

TO ANSWER QUESTIONS 1-53 AND 1-54, SELECT FROM FIGURE 1G THE CIRCUIT DIAGRAM WHICH MATCHES THE CIRCUIT NAME IN EACH QUESTION. CHOICES IN THE FIGURE MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL.

1-53. Band-reject filter.

1. A
2. B
3. C
4. D

1-54. High-pass filter.

1. A
2. B
3. C
4. D

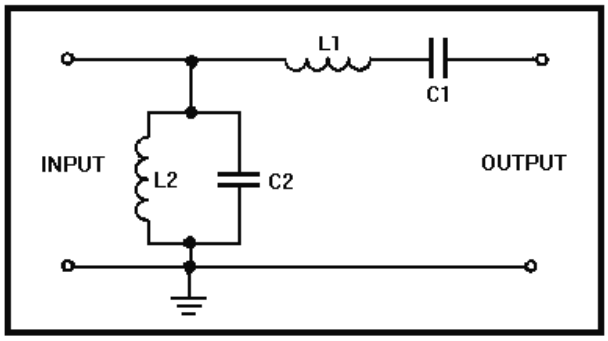

Figure 1H.—Filter circuit.

IN ANSWERING QUESTIONS 1-55 AND 1-56, REFER TO THE CIRCUIT IN FIGURE 1H.

1-55. L1 and C1 in the circuit offer what type of opposition to (a) frequencies near resonance and (b) all other frequencies?

1. (a) Minimum (b) minimum
2. (a) Minimum (b) maximum
3. (a) Maximum (b) maximum
4. (a) Maximum (b) minimum

1-56. In the type of filter circuit in the figure, what is/are the "cutoff point(s)?"

1. Upper frequency limit only
2. Lower frequency limit only
3. Both upper and lower frequency limits

1-57. In a series-resonant circuit that is operating at resonance, what is the amplitude of the applied voltage compared to (a) inductor voltage and (b) capacitor voltage?

1. (a) Lower (b) lower
2. (a) Lower (b) higher
3. (a) Higher (b) higher
4. (a) Higher (b) lower

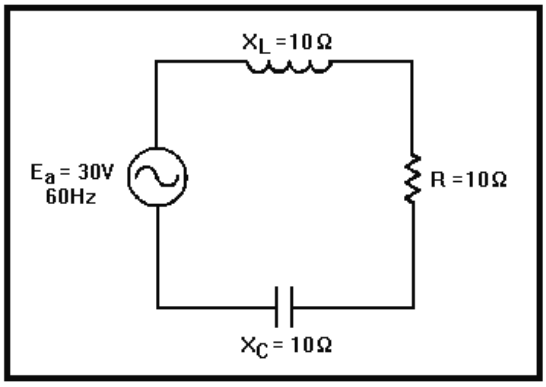

Figure 1I.—Series-RCL circuit at resonance.

IN ANSWERING QUESTIONS 1-58 THROUGH 1-60, REFER TO FIGURE 1I.

1-58. With the circuit in the figure at resonance, what is the circuit current?

1. 1 ampere
2. 2 amperes
3. 3 amperes
4. 0.5 ampere

1-59. If E_a were increased to 60 volts at the resonant frequency, what would be the voltage drop across the capacitor?

1. 10 volts
2. 20 volts
3. 30 volts
4. 60 volts

1-60. If the circuit is at resonance, what is circuit impedance?

1. 10 ohms
2. 20 ohms
3. 30 ohms
4. 40 ohms